

# Permit Required Confined Spaces

Refresher Training

# Why should I care about confined spaces?

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- One of the leading causes of occupational fatalities in this country
- The standard covers 240,000 workplaces and 12.2 million workers
- Workers make 4.8 million entries/year
- Standard may prevent 85% of fatalities and nearly 11,000 injuries

# Why should I care about confined spaces?

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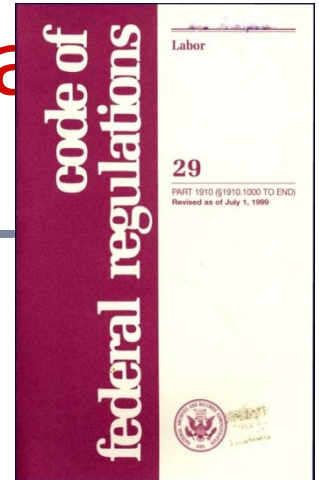
- **Fatality Statistics-Cause of Death**

- 47% Air (Oxygen, Gases, Vapors)
- 21% Drowning (Engulfment)
- 19% Toxic (Liquids, Vapors, etc above PEL)
- 10% Blunt Force Trauma
- 2% Electrocution (Mostly due to objects the victim took in with them)
- 1% Burns

.....Examples of what **NOT** to do!

# Interpretation, Practical Application of the Standard

- 29 CFR 1910.146 - Fed OSHA
  - Letters of Interpretation
  - General Duty Clause
- NAVMC DIR 5100.8 - MC Safety Policy
  - Chapter 14
- BO 5100.1A W/Ch-1 - Base Policy
- Local SOP's - Unit standard operating procedures



# Confined Space: Definition

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- A confined space means a space that:
  - 1. Is large enough and so configured that an employee can bodily enter and perform assigned work: AND
  - 2. Has a limited or restricted means for entry or exit; AND
  - 3. Is not designated for continuous employee occupancy.
- Yes to all = “Confined Space”

# Permit Required Confined Space (PRCS): Definition

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- A PRCS means a **CONFINED SPACE** that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere,
  - Contains a material that has the potential for engulfing an entrant,
  - As an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section,
  - Contains any other serious safety or health hazard.



## Hazardous Atmosphere: Defi.....

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- Hazardous Atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self rescue, or acute illness from one or more of the following cause:

# Hazardous Atmosphere: Definition

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- (1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
- (2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.

- (3) Atmospheric oxygen concentration is below 19.5 percent or above 23.5 percent;



## Hazardous Atmosphere: Definition

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- (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G Occupational Health and Environmental Control, or in Subpart Z Toxic and Hazardous Substances, which could result in employee exposure excess of its dose or PEL
- (5) Any other atmospheric condition that is immediately dangerous to life and health.

# Other Recognized Serious Safety or Health Hazards

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- Electrical equipment
- Mechanical equipment
- Visibility
- Biohazards
- Claustrophobia
- Noise
- Radiation
- Temperature
- Vermin



# Permit Required Confined Space

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- If YES to any = PRCS
- Determine the method of entry
  - Full Permit System
  - Re-Classified PRCS
    - Hazard temporarily removed
  - Alternate Procedure
    - Only hazard atmospheric which is removed by ventilation and entered by established procedures

# PRCS Hazards

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- What hazards have you seen in your spaces during entries?



# Common Hazards & Causes

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- Oxygen Deficient Atmosphere
- Less than 19.5% Oxygen
- Consumption
  - Rusting metal, decomposing organic matter, drying paints solvents, fires
- Displacement
  - Evaporating products, gas or vapor leaks, decomposing matter, inerting tanks or vessels, fires generating CO & CO<sub>2</sub>

## Signs and Symptoms -O<sub>2</sub>

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- **19.5%** = Minimum **acceptable** O<sub>2</sub> level
- **15-19%** = Decreased ability for strenuous work and **impaired coordination**
- **12-14%** = Respiration increases, **poor judgment**
- **10-12%** = Respiration increases, **lips blue**
- **8-10%** = Mental failure, **fainting**, nausea, **unconscious**, **vomiting**
- **6-8%** = 4 to 5 minutes possible recovery, 8 minutes fatal, 6 minutes 50% fatal
- **4-6%** = **Coma** in 40 seconds, **death**

# Common Hazards & Causes

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- Oxygen Enriched Atmosphere
- Oxygen above 23.5%
- Main concern is a fire hazard, causes material to become unstable
- Will absorb in clothing
- Leaking O<sub>2</sub> hoses from work in spaces



## Common Hazards & Causes:

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- Hydrogen Sulfide (H<sub>2</sub>S) (Sewer gas)
- Affects central nervous system
- Produced by decaying organic matter and human septic waste
- Rotten egg odor, affects olfactory senses
- TLV- 10 PPM
- No approved APR



## Signs and Symptoms: H<sub>2</sub>S

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- 20 ppm = PEL (ceiling)
- 100 ppm = Strong unpleasant odor but not tolerable
- 200-300 ppm = eye inflammation, respiratory tract irritation after 1 hr
- 500-700 ppm = Death in ½ to 1 hour
- 100-1000 ppm = Rapid death

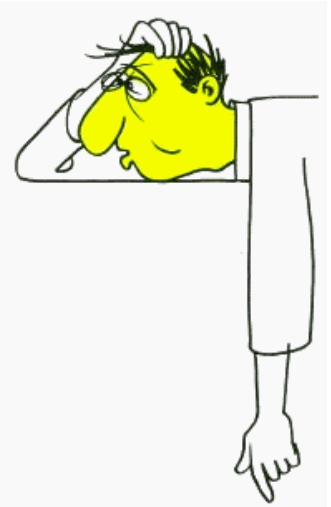
## Common Hazards & Causes: CO

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- Carbon Monoxide from incomplete combustion of fuels and organic matter
- No odor or warning properties
- By the onset of symptoms, in danger
- TLV 25 PPM
- Affects central nervous system
- No APR

# Signs and Symptoms: H<sub>2</sub>S

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- 50 ppm = PEL
- 200 ppm = Slight headache
- 500 ppm = Death in 4 hours
- 1500 ppm = IDLH
- 1600 ppm = Headache, dizziness, nausea in 20 min., death in 1.5 to 2 hrs
- 6400 ppm = Death in 10 to 15 minutes
- 10,000 ppm = Immediate unconsciousness, death in 1 minute

## Common Hazards & Causes: LEL

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- LEL minimum concentration of a flammable gas or vapor that when mixed with air will explode or ignite
- An LEL reading of 10% is the max amount of flammable gas or vapor which may be present for hot work
- Are also extremely toxic below 10%
- For any LEL reading, other than normal meter fluctuation, cancel the permit unless the cause is known

## Responsibilities: EMPLOYEE

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- OSH ACT of 1970, Section 5:

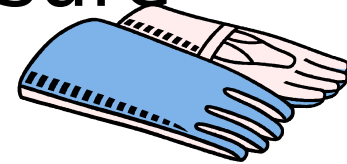
- Duties:

“Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.”

# Responsibilities: Entrant



- Know the hazards, signs or symptoms and consequences of exposure
- Properly use equipment
  - Monitors
  - Retrieval equipment
  - PPE
  - LOTO
- Communicate with the Attendant



# Responsibilities: Entrant

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- Alert Attendant
  - Recognizes exposure signs
  - Dangerous situation or prohibited condition
- Exit space quickly
  - Attendant or Supervisor orders evacuation
  - Recognizes any warning sign or symptom of exposure to a dangerous situation
  - Detects a prohibited condition
  - Alarm is activated

## Responsibilities: Attendant

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- Know the hazards, mode, signs or symptoms and consequences of exposure
- Aware of possible behavioral effects of hazard exposure
- Continuously maintains an accurate count of authorized entrants



## Responsibilities: Attendant

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- Remain outside the space during entry operations until relieved by another attendant
- Communicate with authorized entrants as necessary to monitor entry status and to alert entrants of the need to evacuate
- Monitor activities inside and outside space

# Responsibilities: Attendant

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- Orders entrant to evacuate the space
  - Prohibited condition
  - Detects behavioral effects of exposure
  - Detects situation outside of space that could endanger the entrant
  - If attendant cannot effectively and safely perform all duties
- Summon FESD as soon as determined that the entrant may need assistance to escape

## Responsibilities: Attendant

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- Take the following actions when unauthorized persons approach or enter a space
  - Warn unauthorized persons to stay away
  - Advise unauthorized person to exit
  - Inform entrant of situation
- Perform non-entry rescue specified in SOP

## Responsibilities: Attendant

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- Perform no additional duties that might interfere with the attendants primary duty to monitor and protect the authorized entrant.

## Responsibilities: Entry Supervisor

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- Know the hazards, mode, signs or symptoms and consequences of exposure
- Verifies by checking that the appropriate entries have been made on the permit;
- Verifies that all tests specified by the permit have been conducted;

## Responsibilities: Entry Supervisor

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- Verifies that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin
- Terminates the entry and cancels the permit
- Verifies that rescue services are available and that there is a means for summoning

# Responsibilities: Entry Supervisor

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- Removes unauthorized individuals who enter or attempt to enter the space during entry operations
- Determines whenever the responsibility for an entry is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

## Responsibilities: Section Supervisor/Shop Supervisor

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- Identify all personnel involved in the PRCSEP and provide names, job titles, phone numbers, email addresses and assigned PRCSEP duties to the CSPM annually.
- Review all permits after termination
- Audit at least one entry, by each PRCSEP employee, semi-annually to determine safety awareness and evaluate the employees level of competency or....



## Responsibilities: Section Supervisor/Shop Supervisor

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- Provide annual refresher training that address local procedures and that is approved by the CSPM.
- Ensure that personnel receive the required initial and refresher training to include horizontal program training. Maintain documentation of training.
- Ensure all PRCs are properly labeled

## Responsibilities: Section Supervisor/Shop Supervisor

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- Ensure all cutting, welding, brazing, and heating performed in PRCs is conducted per BO 5100.1A, BO 11320.1L and your local SOP.
- Ensure entry team personnel are provided with all required entry, communication, and rescue equipment.
- Submit copies of canceled permits to the CSPM for each entry within 30 days of cancellation.

## Responsibilities: Section Supervisor/Shop Supervisor

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- Ensure that only the assigned entry supervisor, attendant, or entrant performs atmospheric tests and assesses existing hazards within the PRCs.
- Ensure that internal audits of the program are conducted.

# Responsibilities:

## Department Heads/CO/Directors

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- Develop and publish an internal PRCSEP SOP to include an inventory for each PRCS within the organization.
- Ensure compliance with the training requirements for all PRCS personnel as set forth in BO 5100.1A, NAVMC DIR 5100.8 and 29 CFR 1910.146.
- Ensure all personnel adhere to the SOP for all entries.
- Conduct regular program audits to ensure compliance with applicable regulations and internal instructions.

# Responsibilities: TRAINING

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- Vertical Training
  - PRCs: Initial, Refresher, Internal
- Horizontal Training
  - Personal Protection Equipment
  - Lockout Tag out
  - Respirator Protection Program
  - Hazard Communication
  - Walking Working Surfaces
  - Electrical Safety
  - First Aid & CPR
- Maintain records for as long as an employee or a minimum of 3 years



# Inventory:

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- PRCs ID#: Department specific
- CLASSIFICATION:
  - Class I contains atmospheres or conditions IDLH
  - Class II ...dangerous but not IDLH.
  - Class III ... which are contaminated.
  - Class IV contains no flammable or toxic agents, has an oxygen content consistent with outside ambient conditions, and presents little potential for generation of hazardous conditions.

## Inventory:

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- **NUMBER OF LIKE SPACES**
  - Spaces with same makeup and hazards
- **FACILITY NUMBERS**
  - List all like facility numbers
- **CHARACTERISTICS**
  - Describe the space with the means of entry
- **POTENTIAL HAZARDS**
  - Steam, water, sewage, vermin

## Inventory:

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- ACTUAL HAZARDS
  - List all known hazards
- REQUIRED PPE
- REQUIRED RESCUE EQUIPMENT
- COMMON WORK PRACTICES
- OTHER CONSIDERATIONS
  - LOTO requirements, reference to MSDSs, traffic control, special equipment required.



# PRCS PERMIT

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- Purpose:
  - To ensure for safe entry into PRCSS
  - Provide a means for the Entry Supervisor to document that the conditions for a safe entry have been met prior to employees making the entry
- Historical data for the space for evaluating the hazards
- Provide a copy to CSPM within 30 days

## PRCS PERMIT

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- Maintain on file for one year.
- Post at the entry into the space  
(Not in truck)
- Attach a copy of the Hot Works to the permit

# ***CONFINED SPACE ENTRY PERMIT***

<b>DATE/TIME PERMIT ISSUED:</b>				<b>EXPIRATION DATE/TIME:</b>			
<b>LOCATION (FAC #):</b>				<b>DESCRIPTION:</b>			
<b>PURPOSE OF ENTRY:</b>						<b>DEPT/DIV/SHOP:</b>	
<b>AUTHORIZED ENTRANT(S):</b>				<b>AUTHORIZED ATTENDANT(S):</b>			
<b>TIME OF ACTUAL ENTRY:</b>				<b>TIME OF COMPLETION OF ENTRY:</b>			
<b><u>ATMOSPHERIC TEST DATA</u></b>							
<b>TEST</b>	<b>PRE-ENTRY RESULTS</b>	<b>FOLLOW-UP TESTING RESULTS</b>					
<b>O<sub>2</sub> (19.5 – 22%)</b>							
<b>% LEL (&lt;10%)</b>							
<b>CO (&lt;25 ppm)</b>							
<b>H<sub>2</sub>S (&lt;10 ppm)</b>							
<b>TIME</b>							
<b><u>TOXICS</u></b>							
1)							
2)							
<b>PRE-ENTRY TESTING BY:</b>					<b>DATE:</b>		<b>TIME:</b>
<b>INSTRUMENT</b>	<b>MODEL</b>	<b>SERIAL #</b>	<b>GAS-CAL DATE/TIME</b>		<b>PASSED GAS-CAL: Y/N?</b>		
<b>ZERO CALIBRATION PRIOR TO ENTRY CONDUCTED BY:</b>							

**REQUIRED SAFETY CONTROLS/OBSERVED HAZARDS**

REQUIREMENT	YES	NO	COMMENTS/CONTROL MEASURES/EQUIPMENT
<b>ATTENDANT</b>	<b>X</b>		
* Respiratory Protection			
* Protective Clothing			
* PPE			
Fire Extinguisher			
* Non-Entry Rescue Eqpt			
* Lockout/Tagout			
* Ventilation			
* Follow-up Testing			
* Other Controls			
Are workers trained?			

**\* COMMENTS REQUIRED IF CHECKED "YES"**

Communication: (Circle)	<b>VISUAL</b>	<b>DIRECT VERBAL</b>	<b>PHONE</b>	<b>RADIO</b>
<b>EMERGENCY CONTACT: BASE FIRE DEPARTMENT (EMS)</b>			<b>PHONE: 911</b>	
<b>IS THE SPACE LABELED? YES or NO</b>		<b>OTHER COMMENTS:</b>		
PERMIT ISSUED - ENTRY SUPERVISOR'S SIGNATURE:  PRINT NAME HERE:		PERMIT CANCELLED - ENTRY SUPERVISOR'S SIGNATURE:  PRINT NAME HERE:		
PERMIT REVIEWED BY (INITIALS & DATE): SHOP SUPERVISOR			CSPM	

- PERMIT MUST REMAIN AT ENTRY POINT(S) UNTIL WORK IS COMPLETE - A COPY MUST BE FORWARDED TO CSPM WITHIN ONE WEEK OF ENTRY - MAINTAIN ONE COPY AT SHOP LOCATION - ONLY AUTHORIZED ENTRANTS LISTED ON PERMIT MAY ENTER PRCS -PERMIT MUST BE FILLED OUT COMPLETELY - NOTIFY CSPM OF ANY UNEXPECTED HAZARDS OR EMERGENCIES ENCOUNTERED- FOR ASSISTANCE CALL CSPM - ( 910) 451-7449

## Hot Works Permits

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- Per BO 11320.1L “Welding and cutting will be conducted only in approved and specially equipped shops. When those operations must be done outside the approved shops, the following procedures will be carried out:
  - Secure a Hot Work Permit form the FESD at 451-3004 before beginning the operation.



## Hot Works Permits

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- Remove all combustible materials to a safe distance or use flameproof covers.
- Ascertain that appropriate first-aid fire fighting equipment is on hand and that a fire watch is posted.”
- Maintain a copy with the entry permit
- Only FESD personnel are authorized to issue a Hot Works permit!

## Calibration/Bump Test

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- Before the employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order.

29 CFR 1910.146

# Calibration/Bump Test

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- Calibration for the different types of monitors will be conducted per the manufacturers instructions.
- Monitors will be verified for proper operation daily prior to use by performing a calibration or by performing functional (bump) test.
- Record the results of the calibration or bump test in the calibration log and on the permit.
- Fresh air or zero calibrate the monitor prior to each entry of the day.



# Calibration/Bump Test

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- Calibration:
  - A known concentration calibration gas is applied to the monitor and the monitor is adjusted to the gas.
- Fresh Air or “Zero” Calibration:
  - Zeroing the monitor in a fresh air environment.
- Bump Test:
  - Verifying the function and accuracy of the monitor by applying a known concentration calibration gas to the monitor and observing the readings. The readings should be within a certain percentage of what is on the bottle.

# Calibration/Bump Test



- Calibration Gas
  - Important to choose the right mixture
  - Calibration Standard – base on gas used to perform the calibration
  - If a gas is known to be present in the space, try and use that cal gas if available (methane, propane, Pentane)
- Example
  - Calibrated w/propane detecting methane (Ratio 1.5 to 1)
  - LEL on monitor is 5% True LEL 3.3% Rd up = 4%
- Manufacturers provide charts on calibration ratios for exposure to different gases.

# Emergency Response

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- Non-Entry rescue authorized only!
- Most PRCS deaths are from would be rescuers
- Maintain a means to communicate with the FESD, annotate on permit
- Dial 911!!



## Working with Contractors

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- Contracting officer or ROICC shall inform the contractor that CSE personnel shall be adequately qualified and all operations are to be conducted under requirements of 29 CFR 1910.146.
- MCB personnel shall not certify spaces or issue permits for contractor operations or personnel.
- Dual entry, dual program requirement

# Questions?

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